

Coastal Observation Technology System Project Summary – 2005

Project Name/Title: Coastal Observation III – A Continuation of the OASIS Project: A Wallops Coastal Ocean Observation Laboratory Project (COTS III)

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Project Summary: The focus of this project is to establish an ocean observing system along the coastal ocean regions of Virginia, Maryland and Delaware. We also will develop and test new sensors, platforms and applications to support NOAA and NASA coastal ocean remote sensing activities and products. We are developing, testing and deploying a fleet of solar-powered surface autonomous vehicles called the Ocean-Atmosphere Sensor Integration System (OASIS) that is being commercialized with support from NASA's Small Business Innovation Research (SBIR) program. Software is being developed for command and control of multiple OASIS platforms to support real-time dynamic mapping capabilities. Several novel field instruments are being developed for incorporation into OASIS platforms including: a multi-spectral *in situ* fluorometer to support harmful algal bloom (HAB) detection and a robotic arm for controlled pointing of optical instruments to support above-water radiance measurements. A Coastal Bio-Optical buoy (COBY) will be deployed and maintained during biweekly cross-shelf surveys. In addition, we will monitor the cross-shelf variability of ocean temperature, salinity and fluorescence by deploying several Autonomous Underwater Vehicles (AUV) or gliders in years two and three of this effort. We also propose to continue investigating the interactions between biology and physics in this ocean margin system. In the first year of this effort, we will create a full surface current product for the Mid-Atlantic Coastal Ocean Regional Association (MACORA) by maintaining a system of three long-range and two standard-range high frequency (HF) radars for measuring surface currents. Finally, the project is establishing and fostering new collaborations with regional partners and is developing strong educational and outreach efforts. All field observations will be obtained using standard protocols. Real-time observations will be archived onto our CODAAC data handling system and made available to the public using OpenDAP protocols.

Accomplishments to Date:

- Completed OASIS platform design that exceeds design specifications and within planned budget (less than \$30K).
- Completed guidance, navigation and control software.
- Collaborated with NASA Goddard Space Flight Center (GSFC) Autonomous Sensor Fleet software group to create an application for multiple platform command and control to support dynamic mapping and other science-driven applications.
- Completed testing of a novel multispectral *in situ* fluorometer to support HAB detection.
- Established an effort with NOAA National Ocean Service's Center for Operational Oceanographic Products & Services and Old Dominion University (ODU) to operate three long-range HF radar stations along the Delmarva Peninsula and four standard-range HF radar stations at the mouth of the Chesapeake Bay.
- Obtained field equipment to support development of a COBY.
- Purchased and installed computer system to develop OpenDAP/Distributed Oceanographic Data System (DODS) data archival system.
- Developed air-sea heat and gas flux sensors for OASIS platform with the NOAA Environmental Technology Laboratory (ETL) and Lamont-Doherty Geological Observatory collaborators.
- Finalized cruise survey plans and established working collaborations with researchers at NOAA, NASA, the United States Coast Guard (USCG) and a number of universities.
- Upgraded phytoplankton photophysiology laboratory to support regional field surveys.

Current Year Objectives:

- Support maintenance of three long-range and four standard-range HF radar systems and provide manpower support for analysis of Chesapeake Bay mouth data via ODU. Create HF radar product for Mid-Atlantic Coastal Ocean Regional Association (MACORA) surface current estimate. Provide archival of standards-compliant regional HF radar data sets.
- Maintain deployment status of COBY.
- Carry out 26 biweekly cross-shelf surveys along the COBY survey line.
- Complete fabrication of additional OASIS platforms.
- Complete development and testing of optical robotic pointer system.
- Complete field tests of OASIS Guidance and Navigation control (GNC) systems to support station-keeping transects and optimal interpolation (OI) mapping capabilities.
- Begin deployment of OASIS platforms under various observing scenarios: stations-keeping, cross-shelf surveys, HAB monitoring, Chesapeake Bay monitoring and air-sea gas and heat flux measurement.
- Carry out quarterly surveys of Delmarva coastal ocean to support bio-physical process studies.

- Conduct field tests of sensor for specific OASIS applications including HAB detection, air-sea gas flux, etc.
- Develop additional educational and outreach components.
- Develop a standards-compliant data archival system that is Web accessible to support open distribution of real-time observations and product. Part of this effort will include parsing out of CODAR observations to Rutgers University to produce the regional MACORA surface current product.
- Archive local ocean color and Sea Surface Temperature/Local Area Coverage (SST LAC)/high resolution data sets.

Partners: NASA, NOAA/ETL, NOAA/National Ocean Service (NOS), Old Dominion University, Rutgers University, Donald L. Blount & Associates, DLBA Robotics, Emergent Technologies, EG&G Services, SGT, University of Maryland, Virginia Marine Science Consortium, Pacific Gyre and Noesis.